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Ownership, Competition, and Corruption

Bribe Takers versus Bribe Payers

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Abstract

Over the past few years, many studies have looked at the macroeconomic, cultural, and institutional determinants of corruption. This study complements these cross-country studies by focusing on microeconomic factors that affect bribes paid in a single sector of the economy. Using enterprise-level data on bribes paid to utilities in 21 transition economies in Easter Europe and Central Asia, Clarke and Xu look at how characteristics of the firms paying bribes (such as ownership, profitability, and size) and characteristics of the utilities taking bribes (such as competition and utility capacity) affect the equilibrium level of corruption in the sector. On the side of bribe payers, enterprises that are more profitable, enterprises that have greater overdue payment to utilities, and *de novo* private firms pay higher bribes. On the side of bribe takers, bribes paid to utilities are higher in countries with greater constraints on utility capacity, lower levels of competition in the utility sector, and where utilities are state-owned. Bribes in the utility sector are also correlated with many of the macroeconomic and political factors that previous studies have found to affect the overall level of corruption.

This paper—a product of Regulation and Competition Policy, Development Research Group—is part of a larger effort in the group to understand the economic impact of privatization and competition in network utilities. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Paulina Sintim-Aboagye, room MC3-300, telephone 202-473-7644, fax 202-522-1155, email address psintimaboagye@worldbank.org. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted at gclarke@worldbank.org or lxu1@worldbank.org. February 2002. (33 pages)

OWNERSHIP, COMPETITION, AND CORRUPTION:

BRIBE TAKERS VERSUS BRIBE PAYERS

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Key words: Corruption, bribes, ownership, competition.
JEL codes: Illegal behavior, K4; market structure, L1; industry studies, L9.

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I. INTRODUCTION

Since the pioneering papers on corruption and rent seeking in the sixties and seventies (Becker, 1968; Becker and Stigler, 1974; Krueger, 1974; Leff, 1964; Rose-Ackerman, 1978), many studies have looked at the determinants and consequences of corruption.[1] While some authors have seen bribes either as "grease money" that lubricates the squeaky wheels of rigid bureaucracy and commerce (Leff, 1964; Huntington, 1968) or as an endogenously generated price mechanism that corrects disequilibria and restores optimal allocation in the market (Lui, 1985), most have viewed corruption less positively, suggesting that it distorts economic decisions. For example, it has been suggested that corruption might result in the misallocation of talent to occupations with large opportunities for rent seeking (Baumol, 1990; Murphy *et al.*, 1991), might bias bureaucrats towards purchases on which it is easier to collect bribes (Shleifer and Vishny, 1993), or might affect income distribution adversely (Rose-Ackerman, 1978). Consistent with the less flattering view of corruption, recent empirical studies have found that corruption hampers growth, reduces income, and increases inequality (Mauro 1995; Myrdal 1968; Li *et al.*, 2000; Bardhan 1997),[2] while other studies have found that it reduces investment (Mauro, 1995), increases the size of the unofficial economy (Friedman *et al.*, 2000; Murphy *et al.*, 1993), and is associated with lower levels of human capital, urbanization, financial depth and foreign trade (Li *et al.*, 2000).[3]

In addition to the literature on the effect of corruption on economic outcomes, a large supplementary literature has appeared on the determinants of corruption. These studies have found that corruption is lower in countries that are more open to foreign trade; countries with protestant traditions and that were formerly British colonies; countries with longer exposure to democracy; countries that are more democratic; countries with greater political stability and

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[1] See Bardhan (1997) for an excellent review of issues. Also see Rose-Ackerman (1978).

[2] The inequality-raising effects are not observed for high levels of corruption because the income levels are likely to be low for most people, resulting in low levels of income inequality (Li *et al.*, 2000).

[3] Other studies of corruption include Alam (1990), Ades and Di Tella (1997), Bliss and Di Tella (1997), De Long and Shleifer (1993), Fisman (2001), Johnson *et al.* (1988), Johnson *et al.* (1997) Li (1999), and Mookherjee and Png (1995).

greater freedom of the press; and countries with parliamentary systems (see, for example, Ades and Di Tella, 1999; Treisman, 2000; Lederman *et al.*, 2001; and Wei, 2000).[4] Most of these earlier studies have used cross-country subjective indices (e.g., from the International Country Risk Guide) and have focused on how macroeconomic, cultural and institutional factors affect the overall level of corruption.

Although this paper fits squarely into the existing literature on the determinants of corruption, it complements it in several ways. First, rather than using subjective survey data on the level of corruption, this paper uses data on the actual bribes that enterprise managers report paying (as percent of revenues) – a measure that does not suffer from some of the problems associated with subjective measures.[5] More importantly, rather than focusing on the overall level of corruption in a country, the paper looks at firm-level data on bribes paid to a single sector of the economy – infrastructure. This allows us to focus on characteristics of the enterprises that pay and receive bribes in addition to characteristics of the institutional and macroeconomic environment. For enterprises paying bribes, we look at whether willingness-to-pay and ownership of the enterprise offering the bribe and the nature of the enterprises' relationship with the utility affects the equilibrium level of the bribe payment. On the other side of the equation, we look at whether the equilibrium bribe payment is affected by capacity, competition and privatization in infrastructure – factors that might affect either the internal incentives of the utility companies or their ability to demand bribes.

The empirical results are largely consistent with the conceptual framework presented in the next section of the paper. We find that the bribe payments are lower in countries where infrastructure is better developed, suggesting that excess demand is an important determinant of corruption. The extent of competition in the telecommunications sector, measured by the number of cellular operators in the country, also appears to reduce the equilibrium level of

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[4] However, some results vary between studies. For example, Lederman *et al.* (2001) find that corruption is lower in democracies, while Treisman (2000) finds no evidence of this. In addition, whereas Fisman and Gatti (2001) find that corruption is lower in countries with greater decentralization, Treisman (2000) finds corruption is higher in federal states. Finally, Knack and Azfar (2000) find that the association between corruption and trade intensity is not robust when they use measures of corruption that are available for larger samples of countries. They argue that this is because larger samples are less subject to selection bias.

bribes. After controlling for capacity and competition, we also find that bribes are lower in countries where the utility companies have been privatized. One potential explanation for this final result is that private owners might have a greater incentive than public managers to impose stiff penalties upon employees taking bribes, reducing bribe payments.

Characteristics of the enterprise offering the bribe also affect payments. For example, enterprises that are more profitable appear to pay higher bribes - a result that is consistent with both the queuing (Lui, 1985) and the endogenous harassment (Myrdal, 1968) theories of corruption. Also consistent with the endogenous harassment theory, firms with higher overdue payments to utilities appear to pay higher bribes, perhaps because they have a weaker bargaining position vis-à-vis the employees of the utility company. The duration of the relationship between the enterprises paying and receiving the bribe and ownership also appears to matter: *de novo* private firms are found to pay higher bribes than established firms. Finally, we find strong support for the complementarity of the overall level of corruption in a country and bribes in the utility sector.

II. CONCEPTUAL FRAMEWORK

Consider a company that provides utility services (i.e., power or telecommunications services) and many firms that demand the service. If there is excess demand for the service that the utility provides – for example if there are price ceiling or if limits on public investment have historically limited system expansion – there will be rents associated with access to utility services.[6] In this situation, if employees of the utility company have some discretion over which enterprises or individuals get connected to the service or have broken down connections repaired, utility employees will be able to demand additional payments from the firms and individuals

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[5] See Bertrand and Mullainathan (2001) for a general discussion about problems related to subjective survey data.

[6] In practice, utility services in many developing and transition economies have been severely rationed, with long waiting lists for connections. The average waiting list over the number of main lines (or the waiting list ratio) is 0.17 for the 17 countries in our sample that have non-missing values for waiting list ratio in 1998 (authors' calculation based on the ITU data). In addition, see footnote 9.

demanding service or repairs in return for reducing wait periods.[7] Enterprises will be less willing to pay bribes when the excess demand for utility service is lower – i.e., lower excess demand will force down the shadow price of utility service and, thus, lower the enterprises' willingness to pay bribes.[8] Since, other things being equal (including income level), we would expect excess demand for service to be highest in those countries with the largest capacity constraints, we thus expect:[9]

Hypothesis 1. Bribes paid to utilities will be lower in countries where the utility's capacity is greater.

Privatization of the utility company is often associated with an increase in investment and a large expansion of capacity.[10] Hypothesis 1 then suggests that utility privatization will reduce bribe payments by removing capacity restrictions. However, privatization might affect bribes even after controlling for the impact of privatization on capacity. Here the penalty function imposed by management on utility employees who take bribes will play an important role. When a company is privatized, the private owners become residual claimants on the income of the company, giving them a large incentive to reduce corruption. In contrast, under public ownership, it is often not clear who the residual claimants are and who will gain from reducing corruption (e.g., whether the funds would go the Treasury, to political leaders, or to the utility itself). Further, although profits are the property of the general public in theory, individual members of the public have little incentive to monitor the employees of the utility company. Since privatization will raise the marginal benefit of monitoring employees without affecting the marginal cost, privatization will increase the optimal amount of monitoring, and thus reduce the extent of bribes.

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[7] Of course, the utility employees will have to balance the gains from the bribe with the possible loss of income due to the penalty they will face if caught.

[8] This is similar to the point made by Ades and De Tella (1999).

[9] Although the waiting period might be seem to be a more appropriate measure of excess demand, waiting period is often poorly measured and can be endogenous if long waits deter people from bothering to request service.

[10] See, for example, recent studies of the effect of privatization on the telecommunications sector (Ros, 1999; Wallsten 2001; Li and Xu 2001).

Other aspects of public ownership might also increase corruption under public ownership. In general, principal-agent problems between owners and managers might be worse for publicly owned enterprises.[11] In particular, it is often difficult to tie managers' salaries to profits under civil service pay schemes or to reward public managers with stock or stock options.[12] Even if contractual arrangements linking the managers' wages to profitability are politically feasible, in the weak institutional environments found in many developing and transition economies, it would be difficult to find credible third parties that could force the government to honor it contractual obligations (Shirley and Xu, 1998). Under these circumstances, and especially if side-payments from corrupt employees are possible, managers might not be willing to exert much effort to reduce corruption. Finally, in countries where inflation or pay freezes have eroded salaries in the civil service and public utility, threats to fire corrupt employees will generally be less effective. These factors, combined with greater monitoring by private owners (relative to public owners), will mean that privatization should reduce both stealing and bribes even if privatization fails to reduce excess demand. We thus have *hypothesis 2.*

Hypothesis 2. Bribes will be lower when the utility company is privately owned.

Competition faced by the utility company might also reduce corruption. First, increased competition might increase the total supply of infrastructure services (relative to supply under a monopoly), because monopolists take into account the effect that raising output has on prices when setting output levels. According to hypothesis 1, this quantity effect should reduce bribe payments. Moreover, when there are multiple utility service providers, utility customers can respond to demands for bribes by switching to other providers. Anticipating this, the producer might be less likely to ask for bribes or to ask for lower bribe payments (Rose-Ackerman 1978; Shleifer and Vishny 1993; Ades and Di Tella 1999). The effect of competition on bribes will depend crucially upon whether the users' threats to change utility company are credible.

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[11] For example, Shirley and Xu (1998) note that managers of public enterprises answer to many principals, who impose differing, and sometimes conflicting, objectives and constraints upon them.

[12] Laffont and Tirole (1991) note that because managers of public enterprises do not own stock or stock options and are not subject to corporate takeovers that could cost them their jobs, they typically have less reason to adopt a sufficiently long-term perspective focusing on productive efficiency. Similarly, this will make it more difficult to encourage managers to reduce corruption among employees even when it affects profitability.

Because of this, in the telecommunications sector, the number of cellular operators should provide a better measure of competition that the number of fixed-line operators. Even when there are multiple fixed-line operators, local monopoly provision of services is likely – in contrast, cellular operators will often compete locally with fixed line operators. We thus expect bribes to be lower in countries with greater competition, as measured by competition from cellular operators.

Hypothesis 3. Bribes to utilities will be lower in countries with greater competition in infrastructure.

So far we have focused on the bribe taker, the utility companies. However, characteristics of the bribe payer, the firm demanding utility service, might also affect bribe payments. The simplest theory about the determinants of bribing behavior of utility customers (firms in this paper) is the "speed money" or the efficiency theory of bribes (Barzel, 1974; Lui 1985; Leff 1964; Huntington 1968). Assuming there is no stigma associated with bribery – or at least that the stigma associated with paying bribes does not depend on enterprise profitability – firms that benefit more from utility service will generally offer larger bribe payments for reduced wait periods for connection or repairs. Consequently, we would observe allocation of the utility services according to the value that different enterprises place on utility service. Under this hypothesis, utility services will be allocated efficiently with the bribe acting as a perfect price discrimination mechanism. Although the benefit that an individual firm gains from utility services is unobservable, it is reasonable to assume that firms that are more profitable will generally benefit more the utility services. This can be justified, for example, by the plausible assumption of complementarity of managerial ability or monopoly rents with utility service. With this assumption, the "speed money" theory of bribery implies

Hypothesis 4. Enterprises that are more profitable will pay higher bribes than less profitable enterprises.

Hypothesis 4 can also be explained by the endogenous harassment theory, as suggested in Myrdal (1968) and further elaborated in Kaufmann and Wei (1999). The provider can use observable information such as industry, size, or profitability to guess each enterprise's maximum willingness-to-pay for utility service and endogenously offer incentive compatible bribe levels that

depend on such characteristics. In this case, the relationship between bribe payments and profitability will also be positive. Although the basic ingredient in both the 'speed money' and the endogenous harassment theories is that the bribe amount of different firms increase with the willingness-to-pay for service, the utility employees demanding the bribe need more information in the 'endogenous harassment' theory. In the "speed money" hypothesis the enterprise paying the bribe self-selects the amount of the bribe according to its cost of waiting, while the endogenous harassment version requires that the utility employees taking the bribe discriminate between enterprises and, thus, require that the utility has information on profitability and other firm characteristics that affect the enterprises' willingness-to-pay. In practice, the data used in this paper do not allow us to easily distinguish between these two theories.

Related to the endogenous harassment theory, another factor that might affect enterprises' willingness-to-bribe is size of the enterprises' overdue payments to the utility company – something that is a significant problem in many countries in Eastern Europe and Central Asia.[13] When an enterprise had high debts to the utility company, the utility employee can more credibly threaten to cut the enterprises' utility connection – the enterprise manager would find it more difficult to complain to either the judiciary or to the employee's superiors within the utility company about being disconnected if he has overdue payments. In bilateral bargaining between the utility employee and the firm, the fallback position of the firm is worse and, hence, its bargaining power is weaker. Consequently, the utility employee will be able to extract higher bribes from firms that have overdue payments to the utility. In contrast, overdue payments to workers or suppliers should not have this effect – although the utility employee would be able to threaten to cut off service to a non-paying customer, it would not be able to do the same to a customer that pays its utility bills in a timely way but has overdue payments to suppliers or employees. Further, to the extent that overdue payments suggest that the enterprise is distressed or has cash flow problems, we might expect enterprises with other types of overdue payments to be less willing (or able) to pay cash bribes. Since several authors have argued that overdue payments to workers are a better measure of financial distress than overdue payments to suppliers, we might expect enterprises with overdue

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[13] In the World Business Environment Survey (WBES) for the transition economies, 33 percent of enterprises reported having overdue payments to utilities. For a general discussion of non-payment in the power sector in Eastern Europe and Central Asia, see World Bank (1999).

payments to workers to pay lower bribes than enterprises without overdue payments to workers.[14] We thus arrive at hypothesis 2.

Hypothesis 5. Enterprises with higher overdue payments to the utility company will pay higher bribes than other enterprises. In contrast, enterprises with overdue payment to workers and suppliers will pay similar or lower bribes to utilities.

The relationship between the enterprise paying the bribe and the utility receiving the bribe might also influence the size of the bribe. For example, *de novo* private enterprise might pay higher bribes than other enterprises for several reasons. First, if *de novo* private firms were more profitable than other enterprises, we would expect them to pay higher bribes.[15] Second, bribe taking might be more risky for the utility employees in the early stages of the relationship. For instance, before the utility employee has developed a relationship with the bribe payer, there is higher likelihood that the enterprise paying the bribe would inform others about the corrupt deal or that the deal is part of a 'sting' operation by either law enforcement or the employee's managers. Since this increases the risk that the utility employee will be detected and punished, the employee might demand higher payments, as a form of risk premium, to let the deal proceed. As the relationship becomes consolidated with years of collusion, the bond is no longer needed and a stream of variable payment is sufficient.[16] Consequently, we might expect *de novo* private firms to pay higher bribes than other types of firms, which will have already developed relationships with employees of the utility company.

Hypothesis 6. De novo private firms pay higher bribes than established firms.

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[14] Schaffer (1998) argues that since suppliers can always stop shipping to non-paying customers, inter-enterprise arrears do not necessarily signal financial distress. In contrast, given the high rates of unemployment in many transition economies – and regional economies heavily dependent on single enterprises – the same might not be true for workers.

[15] Megginson and Netter (2001) and Shirley and Walsh (2000) discuss reasons why privately owned enterprises might perform better than state-owned enterprises and present evidence that supports these hypotheses. Since the start of the transition over ten years ago, many studies have compared the relative performance of state- and privately owned enterprises in Eastern Europe and Central Asia. A recent meta-analysis of these studies found that privately owned enterprises appear to generally perform better than state-owned enterprises in these economies (see, Djankov and Murrell, 2000).

[16] Maybe it is in this sense that "It used to be said of General Noriega of Panama in his heyday that he could not be *bought*, he could only be *rented*" (quoted by Bardhan 1997, p. 1324).

In addition to characteristics of the utility taking the bribe and the enterprise paying the bribe, the environment in which the enterprise and utility operate might also affect bribe payments, especially in light of the multiple-equilibria nature of corruption. The incentives of an individual to be corrupt depend on how many other people are corrupt (Andvig 1991). When the society is already corrupt, the moral costs of corruption are low, making the strategy of being corrupt a Nash equilibrium. Moreover, given limited enforcement resources, the possibility of being detected might also be lower in more corrupt societies. We thus expect bribes in the *utility sector* to be higher in countries where *other forms of corruption* are more common. In other words, factors that raise the general level of corruption in a country might also increase bribe taking in the utility sector even if they have little direct effect on the incentives of either the enterprise paying the bribe or the utility receiving the bribe.

As previously discussed, there is a large literature that discusses factors that might affect the *overall* level of corruption in a given country. First, several authors have argued that the rents might be lower in more competitive economies and, therefore, that corruption might also be lower in these countries (Rose-Ackerman 1978; Shleifer and Vishny 1993; Ades and De Tella 1999). Consistent with this, Ades and De Tella (1999) find that corruption is higher when domestic firms are sheltered from foreign competition by natural or policy induced barrier to trade.[17] To control for this, our base regression includes measures of the extent of competition and the existence of rents similar to those used in previous studies – the ratio of imports to GDP (to measure competition) and the ratio of mineral, fuel and metal exports to total exports (to measure rents). Second, corruption tends to be lower in countries with political institutions that highlight political accountability and give voice to voters. For instance, past studies have found that corruption is lower in countries with longer exposure to democracy (Treisman, 2000) or in countries that are more democratic (Lederman *et al.*, 2001). Third, corruption should be lower in countries that are growing more rapidly. For example, Baumol (1990) and Murphy *et al.* (1991) suggest that occupational choice is affected by the way in which talents are rewarded. When growth is faster, talent will tend to flow to productive sector instead of the rent-seeking sector and, therefore, we might expect corruption to be lower in countries that are growing faster.

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[17] Knack and Azfar (2000) find that this result, however, is not highly robust. See footnote 4.

Hypothesis 7. Given the complementarity of corruption in the society with corruption in the utility industry, we expect utility bribes to be lower in countries with lower level of rents (as measured by a higher level of imports, and lower export shares of fuel, mineral, and metal export), in countries that are more democratic or have longer exposures to democracy; and in countries that are growing more rapidly.

III. EMPIRICAL IMPLEMENTATION

III.1 Data

The main source of data used in this paper is the World Business Environment Survey (WBES), a cross-sectional survey of industrial and service enterprises conducted in mid-1999 by the World Bank and several other agencies.[18] The main purpose of the WBES is to identify perceived constraints on enterprise performance and growth in developing and transition economies. The survey, therefore, has a large number of questions on how taxation, regulation, the performance of the financial sector, the institutional environment and corruption affect business operations. In contrast, the survey includes little information on enterprise characteristics or performance. In particular, although some information on assets, sales, broad sector of operations, ownership, employees, and enterprise growth was collected, detailed balance sheet information and profit and loss statements were not collected from participating enterprises.

Although the WBES was conducted in many countries throughout the world, and some effort was made to ensure cross-country comparability, the degree of detail varies greatly between regions. For example, although data was collected on actual sales, fixed assets, and debts in some regions, only categorical data on the same information was collected in other regions. For the purpose of this study, the most important difference between the surveys completed in various regions is that questions that allow us to calculate bribes paid to utilities

[18] The survey of the transition economies was conducted in collaboration with the European Bank for Reconstruction and Development. Hellman *et al.* (2000) and European Bank for Reconstruction and Development (1999) provide more complete descriptions of the survey.

were asked only in the transition economies of Eastern Europe and Central Asia. The sample includes about 3000 enterprises from 21 transition economies.[19]

The enterprise level data from the WBES is supplemented with data from a variety of other sources. In addition to characteristics of the enterprise paying the bribe, the analysis also includes characteristics of the utilities, the enterprises receiving the bribe payments. In the electricity sector, we focus on the distribution utilities, since these are the enterprises that will generally interface with the (mostly small) enterprises in the WBES sample. However, for the most part, we focus on the telecommunications sector because there are readily available measures of competition and privatization in the telecommunications sector. By the late 1990s, cellular services provided significant competition for fixed line services in many developing and transition economies. By 1999, most of the countries included in this analysis had significant penetration by cellular services (see Figure 1) and in some countries there were nearly as many cellular subscribers as fixed main lines. Further, since the WBES does not provide information on the enterprises' locations within the country, and because electricity distribution is often handled on a local or regional basis, it is generally easier to observe privatization in the telecommunications sector than it is in the power sector.[20] The information on the privatization of telecommunications operators was provided by the World Bank Telecommunications Department and information on the privatization of electricity distribution was obtained from Bacon (1999). Information on number of fixed lines come from International Telecommunications Union (2000), while the number of cellular companies operating in each country was calculated using information from EMC (2001) and *Telecoms and Wireless Reports: Eastern Europe/Commonwealth of Independent State* by Pyramid Research.

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[19] The countries in the sample for transition economies are: Albania, Armenia, Azerbaijan, Belarus, Bulgaria, Croatia, the Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, the Kyrgyz Republic, Lithuania, Moldova, Poland, Romania, Russia, Slovenia, the Slovak Republic, Ukraine, and Uzbekistan.

[20] Bacon (1999) provides information on whether any privatization of electricity distribution had occurred by 1999, but did not provide information on the extent of privatization.

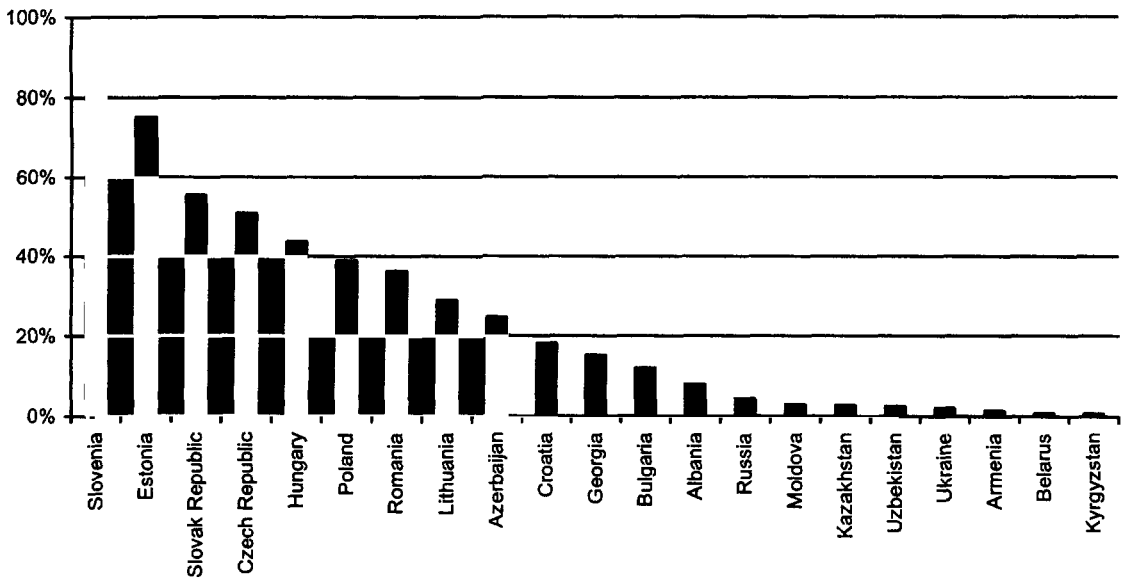

Figure 1: Cellular subscribers per main fixed line.

Data Source: International Telecommunications Union (2001).

The macroeconomic and political data used to control for factors that might affect the overall level of corruption in the countries in the sample are taken from a variety of sources including World Bank (2001), Beck *et al.* (2001), and Freedom House (2000). Table 1 and Table 2 provide sources, brief descriptions and summary statistics for the main variables used in this analysis.

III.2 Empirical Specification

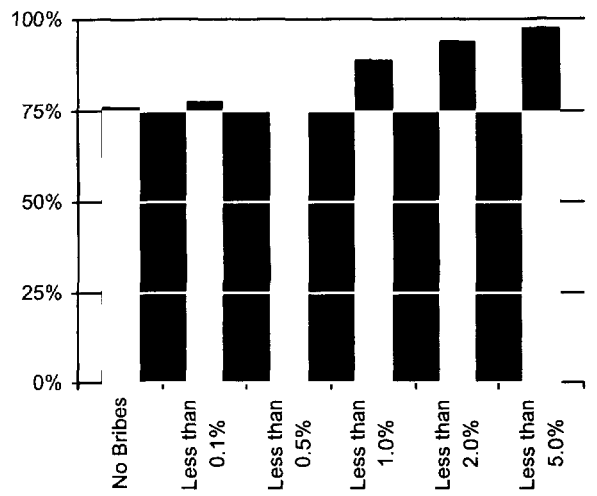

Figure 2: Upper Bounds of Bribe Payments to Utilities (as % of Revenues) in the Sample Countries.

Note: The categories are cumulative. Because each enterprise has unique upper and lower bounds, enterprises are classified by upper bounds. For example, an enterprise that reported paying between 0.1% of revenues and 1.9% of revenues in bribes to utilities would be counted only in the 'less than 2.0%' and 'less than 5.0%' percent categories (even if its actual payments – which are not observed – were only 0.2% of revenues).

The dependent variable used in this study is the percent of revenues paid by the enterprise to electricity and telecommunications utilities in the form of bribes.[21] This variable is calculated using answers from two questions in the WBES – the percent of revenues paid per annum in 'unofficial' payments to public officials (including to the employees of electricity and telecommunications companies) and the share of those unofficial payments that were spent 'to get connected to and maintain public services (electricity and telephone)'. The enterprise manager's response to the first question about total unofficial payments was categorical (i.e., 0% of revenues; less than 1%; between 1 and 1.99%; between 2 and 9.99%; between 10 and 12%; between 13 and 25%; and over 25%), while the manager's response to the second question was any number between 0 and 100% (of total 'unofficial payments'). From this information, it is possible to calculate a range for the percent of revenues that each enterprise reported paying to electricity and telecommunications utilities.[22] About 75 percent of enterprises

[21] The question refers specifically to power and telecommunications, but does not separate between the two. To encourage honest responses to questions about bribery, and to allow enterprise managers to avoid implicating themselves when answering questions about frequency and level of bribe payments, the WBES asked about bribes paid by 'firms like yours' rather than about the manager's own firm. In the empirical analysis, we assume that the manager was answering the question for a firm similar to the manager's own enterprise in terms of the independent variables.

[22] That is, the share to the utilities times the percentage of revenue as unofficial payment. Because the second response could take any value between 0 and 100%, the ranges are distinct for each enterprise.

reported paying no bribes to public utilities (see Figure 2), while about 97.5 percent of enterprises reported an upper bound for bribes to utilities of less than 5.0 percent of revenues.[23]

It is assumed that the percent of revenues paid as bribes to telecommunications and electricity utilities by enterprise i in country j (B_{ij}) is a function of enterprise characteristics (x_{ij}), characteristics of the utilities (u_j), country-level characteristics (z_j) and an unobserved disturbance term (ε_{ij}).

$$B_{ij} = \alpha + \beta_1 x_{ij} + \beta_2 u_j + \beta_3 z_j + \varepsilon_{ij\,ij}$$

As discussed above, lower and upper bounds for bribes as a percent of revenues, b_{ij}^L, b_{ij}^H can be calculated for each enterprise. The contribution to the likelihood function for each enterprise is, therefore, $\Pr\left(b_{ij}^L < B_{ij} < b_{ij}^H\right)$.[24] Assuming that the disturbance term is normally distributed, the log-likelihood function, which can be maximized using standard maximum likelihood estimation, is:

$$L = \sum_{i,j} \log\left[\Phi\left(\frac{b_{ij}^H - \alpha - \beta_1 x_{ij} - \beta_2 u_j - \beta_3 z_j}{\sigma}\right) - \Phi\left(\frac{b_{ij}^L - \alpha - \beta_1 x_{ij} - \beta_2 u_j - \beta_3 z_j}{\sigma}\right)\right]$$

where Φ is the standard normal distribution.

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[23] Note that although we know that an enterprise that reports an upper bound of less that 5 percent definitely paid less than five percent of revenues as bribes (ignoring reporting errors), it does not follow that those enterprises that reported an upper bound greater than 5 percent of revenues necessarily paid over 5 percent of revenues in bribes to utilities. For example, an enterprise that paid 2 percent of revenues in bribes could report lower and upper bounds of 1.2 and 6 percent (i.e., the actual level of bribes is between the two bounds). Only 0.3 percent of enterprises reported lower bounds greater than 5.0 percent of revenues (i.e., only 0.3 percent of enterprises reported ranges that were entirely above 5.0 percent of revenues) and no enterprises reported a lower bound greater than 8.0 percent of revenues.

[24] The estimation takes truncation below, at 0% of revenues, into account (i.e., negative bribes are not observed).

The measure of corruption used in this study has some advantages over the subjective indices used in previous studies of the determinants of corruption.[25] One problem with subjective indices is the question of what benchmarks respondents use for rating the extent of corruption. For example, some respondents might compare corruption in a country to corruption under a previous regime, others might compare it with neighboring countries, while others might even compare it with their own personal ideals. If different respondents use different benchmarks, subjective indices might suffer from large noise-to-signal ratios.[26] Moreover, there might be systematic errors due to cognitive problems, social desirability of answers, non-attitudes, wrong attitudes, and soft attitudes (Bertrand and Mullainathan, 2001; Tanur, 1992; Sudman *et al.*, 1996). If these systematic errors are correlated with enterprise (or country level) characteristics, and it is difficult to obtain instruments that are correlated with the explanatory variables but not the systematic errors, results using the indices as dependent variables will be biased. Consequently, some authors have suggested that although subjective indices might be useful as explanatory variables (although they will still suffer from attenuation bias and when correlated with other explanatory variables, inconsistency), they are less likely to be effective as dependent variables (Bertand and Mullainathan 2001).[27]

III.3 Econometric Results

Enterprise Ownership for Enterprise Paying Bribe. The base regression (see Table 3) includes several dummy variables to control for the ownership of the enterprise paying the bribe.

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[25] For instance, a commonly used index, the Business International rating, is based on the assessment of "the degree to which business transactions involve corruption or questionable payments" on a scale from 0 to 10. The remarks of Glaeser *et al.* (2000) about another perception index can be applied here: "While these survey questions are interesting, they are also vague, abstract, and hard to interpret." See Treisman (2000) for a comprehensive discussion of the existing cross-national corruption indices.

[26] Some studies have found evidence consistent with this. For example, the account of the land consolidation program in villages in U.P. in Northern India described by Oldenberg (1987) suggests that, there may often be discrepancies between personal assessment about corruption frequency and its actual incidence (Bardhan 1997). Measurement error might be especially problematic in studies that include fixed country effects (see Bertand and Mullainathan, 2001).

[27] The most comprehensive study of the cross-national determinants of corruption is Treisman (2000), who is keenly aware of the limitation of such subjective measures. He offers three justifications for the use of these indices: (1) the Transparency International Ratings are highly correlated among themselves, (2) they are also highly correlated among themselves across years, and (3) in a footnote, "a third reason, of course, is that there *are* no objective data on the extent of corruption."

When margin (the measure of enterprise profitability) is included in the base regression, most of the coefficients on the dummy variables indicating ownership are statistically insignificant. This suggests that enterprises owned by foreigners, 'insiders' (i.e., managers and workers) and privatized enterprises owned by outsiders pay similar levels of bribes to state-owned enterprises (the default category). In contrast, the coefficient on the dummy variables indicating that the enterprise is a *de novo* enterprise (i.e., newly established private enterprises) is statistically significant and positive, suggesting that *de novo* enterprises generally pay higher bribes than privatized or state-owned enterprises.[28] The effect appears to be large in quantitative terms – *de novo* private enterprises reported paying between about 0.5 and 0.9 percent more of revenues in bribes than similar state-owned enterprises in the different model specifications.[29]

As discussed previously, there are several plausible reasons why *de novo* enterprises might pay higher bribes than other enterprises. First, many studies have found that private enterprises in general and *de novo* enterprises in particular perform better than state-owned enterprises in the transition economies (see Djankov and Murrell, 2000). As noted previously, both the 'speed money' and 'endogenous harassment' hypotheses suggest that more profitable enterprises should pay higher bribes than less profitable enterprises. Consequently, to the extent that the measure of profitability (i.e., 'margin') does not fully account for performance differences between state and privately owned enterprises, the ownership dummies might be partially proxying for performance differences.[30] Consistent with the idea that performance differences between private and state-owned enterprises might partially explain the result, the coefficients on the dummy variables indicating *de novo* private enterprises and privatized enterprises increase in magnitude and the coefficient on privatized enterprises becomes statistically significant when margin is excluded (see column 4 of Table 3). Second, as noted

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[28] This pattern is consistent with the pattern observed for total bribes (i.e., bribes to all government officials not just utilities) before controlling for other factors that might affect corruption (see, European Bank for Reconstruction and Development, 1999, p 125-26).

[29] Note that the actual average reduction would be smaller than this since most enterprises did not report paying bribes and, therefore, bribes could not be reduced for these enterprises.

[30] Although foreign-owned enterprises also appear to consistently out-perform state-owned enterprises in the transition economies (see Djankov and Murrell, 2000), the small number of these enterprises in the sample (see Table 2) might make it difficult for the coefficient on this dummy variable to achieve statistical significance.

earlier, if managers of *de novo* enterprises have less well developed relationships with either the utility employees demanding bribes, utility employees might demand higher bribes to compensate them for the additional risk of taking bribes for performing favors for the entrepreneur (for example, for 'misreading' meters). Finally, managers of *de novo* enterprises might, in general, have less political influence with government officials (e.g., judges or police officials) meaning that they are less likely to be able to appeal to them when threatened by utility employees (e.g., to avoid 'sudden' breakdowns in service).

Enterprise Profitability. Enterprises that were more profitable reported paying higher bribes than less profitable enterprises. This is consistent with either the endogenous harassment or 'speed money' theory of corruption (see Hypothesis 4). A one-standard-deviation increase in margin raises reported bribes to utilities by about 0.2 percent of revenues.

Overdue Payments to Utilities. Since the coefficient on the index variable indicating overdue payments to utilities is negative and statistically significant (and higher values of the index mean lower overdue payments), this implies that enterprises with overdue payments to utilities generally reported paying higher bribes to utilities than enterprises without overdue payments (see Table 3). In contrast, the coefficients on overdue payments to suppliers and workers are either statistically insignificant or have a positive coefficient. The (sometimes statistically significant) positive coefficient on overdue payments to workers might be consistent with the previous results regarding profitability – if enterprises with overdue payments are more financially troubled than other enterprises, they might on average have lower ability/willingness to pay bribes. Although this will also be true for enterprises with overdue payments to utilities, other factors work in the opposite direction. In particular, enterprises with overdue payments might be willing to pay bribes (of less than the amount of the overdue payment) to avoid being disconnected from utility service. The coefficient on overdue payments to utilities suggests that enterprises with substantial (manageable/modest) overdue payments reported paying about 0.15 percent more of revenues to utilities in bribes than enterprises with manageable (modest/no)

overdue payments.[31] These findings are consistent with hypothesis 5 that bribe extraction is higher when the firm is vulnerable to threats by the utility employees.

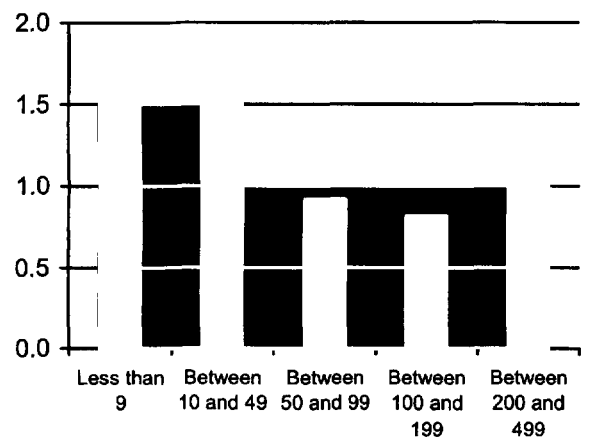

Figure 3: Coefficients on enterprises size dummies in regressions on bribes paid to utilities as percent of revenues (relative to enterprises with over 500 employees).

Data Source: The World Business Environment Survey (WBES) ©2000 The World Bank Group.
Note: Graph shows coefficients on size dummies from regression shown in column 1 of Table 1. Omitted category is enterprises with more than 500 employees. Consequently, coefficients can be interpreted as the additional percent of revenues paid by enterprises of that size over a similar enterprise with more than 500 employees.

Enterprise Size. European Bank for Reconstruction and Development (1999, p. 125-126) finds that small enterprises in Eastern Europe and Central Asia generally paid higher total bribes (i.e., to all sources not just utilities) than large enterprises. Consistent with this, and even after controlling for other factors that might affect corruption, we find that small enterprises generally pay higher bribes than large enterprises (see Figure 3). Enterprises with fewer than 50 enterprises paid about 1.5 percentage points of revenues as bribes to utilities than enterprises with more than 500 employees, while enterprises with between 50 and 500 employees paid about 1.0 percent of revenues more in bribes (see Figure 3). The differences between the amounts paid by enterprises of different sizes are statistically significant.[32]

Ownership of Utilities. Consistent with hypothesis 2, enterprises paid lower bribes to utilities in countries where the fixed line telecommunications and electricity distribution were privately owned (see Table 3). In the regression that excludes the measure of enterprise profitability (i.e., margin), the coefficients on both dummy variables are statistically significant.

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[31] The index variable is coded as 1 for substantial, 2 for manageable, 3 for modest and 4 for none.

[32] The null hypothesis that enterprises of all sizes pay similar share of revenues in bribes can be rejected at less than a 1 percent significance level (χ^2 (5) = 30.37, Prob.> χ^2 is 0.00).

When margin is included, sample size is dramatically reduced and the coefficient on the dummy variable indicating that electricity distribution has been privatized become statistically insignificant at conventional significance levels. Although this might suggest that electricity privatization is less important than telecommunications privatization in this respect, it is important to interpret the result carefully. As noted previously, the local nature of electricity distribution might mean that electricity privatization is measured poorly. Excluding the dummy variable indicating privatization of electricity distribution does not affect any of the other results (see column 2 of Table 3).

To the extent that the variables proxying for the effect of competition and capacity constraints on corruption control for these factors, the variables indicating utility ownership should proxy for the direct effect of ownership. By creating clear residual claimants for the utility's profits, private ownership might increase pressure on enterprise managers to reduce corruption. The point estimates of the coefficient on the dummy variable indicating that the fixed line telecommunications operator is privately owned suggests that utility privatization has a large impact on corruption in the sector, with privatization reducing the percent of enterprise revenues paid in bribes by about 0.6 percentage points.

Capacity and Competition. Consistent with hypothesis 1, enterprises in countries with better-developed telecommunications systems appear to pay lower bribes than enterprises in countries with less developed systems. The coefficient on fixed lines per capita is negative and statistically significant throughout most of the analysis. Since the analysis includes several macroeconomic controls, including per capita income, one plausible explanation for this result is that excess demand for the utility's services is lower in countries with better-developed systems. Increasing the number of fixed lines by about one standard deviation for the transition economies in the samples (see Table 1) would decrease the share of revenues paid as bribes to utilities by about 0.4 percentage points.[33]

Consistent with hypothesis 3, competition also appears to lower bribes paid to utilities – the coefficient on the variable indicating the number of cellular companies is statistically

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[33] This was close to the difference between Ukraine (19.1) and Slovakia (28.6) in 1998.

significant and negative. The point estimate of the parameter suggests that increasing the number of cellular companies by one reduces the share of revenues paid as bribes to utilities by about 0.2 percentage points.

Macroeconomic and Political Controls. Since the overall level of corruption in a given country might affect the level of bribes paid to utilities, the analysis also includes some macroeconomic and political variables that might affect corruption in other areas. To avoid problems associated with reverse causation, the macroeconomic and political controls are lagged at least one year.[34] Given the relatively modest number of countries in this analysis, it is possible to include only a small number of the many variables suggested in the literature in the base regression. However, many additional macroeconomic and political variables – most of which have statistically insignificant effects on bribes paid to utilities in this sample – are included in the sensitivity analysis (see Table 4 and Table 5).

The coefficients on the macroeconomic and political control variables included in the base regression are generally statistically significant with signs consistent with theory and previous analyses. Corruption appears lower in countries with higher levels of democracy; that are more open to imports; where exports of natural resources are less important and where growth is faster. After controlling for these variables, the coefficient on per capita GDP is not statistically significant at conventional levels.

The main results in this study are also robust to several different assumptions regarding the control variables. One concern is that some of the control variables might be endogenous. In particular, Ades and Di Tella (1999, p. 988) suggest that if bureaucrats determine market structure, the level of corruption in any given country might affect the share of imports in GDP. Similarly, others have suggested that corruption might also affect growth (see, for example, Mauro, 1995). In practice, however, the main results from this study are robust to the exclusion

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[34] Macroeconomic data are for 1998. Data from Beck *et al.* (2001) are for 1997, which was the most recent year available at the time of writing. The regulation and corporate tax indices used in the sensitivity analysis are also for 1997, since data for 1998 were also not available.

of either of these variables.[35] Finally, although most of the control variables are available for the all the countries in the sample, exports of minerals, metals and fuel was not available for either Ukraine or Uzbekistan. However, the main results are robust to replacing this variable with a dummy variable indicating that the country is an oil exporter (see column 5 of Table 3), which is available for the entire sample. Since mineral, fuel and metals made up a considerably greater share of exports for oil exporters than for non-exporters, this dummy variable seems to be a reasonable measure of the importance of natural resources in a country's exports.[36] Consistent with the previous results, the coefficient on the dummy is positive and statistically significant, providing more evidence that corruption is higher in countries where economic rents are more important.

Sensitivity Analysis. Over the past decade, many studies have looked at country level variables that might affect the overall level of corruption. Although most of these determinants would not be expected to affect corruption in the utility sector *per se*, to the extent that they affect the overall level of the corruption in the country, they might have an indirect effect on corruption in the utility sector. Given the relatively modest number of countries in the sample (see footnote 19) and the large literature on the potential determinants of corruption, it would be impossible to simultaneously include all possible regressors in a single regression, especially since many are unavailable for some countries in the sample. However, to check robustness, we add many variables suggested in the literature – including regional dummies, measures of regulation and taxation, alternative measures of the political and institutional environment, factors that might affect natural openness, and measures of government spending and decentralization – to the base regression (i.e., column 2 of Table 3).[37] In addition, we also include a subjective measure of corruption in the regression as an additional robustness check.

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[35] The coefficients on the main variables of interest (i.e., the variables listed in Table 4) remain similar in terms of size and statistical significance when either variable is excluded.

[36] For the countries in this sample 63 percent of exports were mineral, fuel or metals for oil exporters in 1998 compared to 10 percent for non-exporters (authors' calculations). The difference in means is statistically significant at higher than a 1 percent level.

Although this variable is potentially endogenous (i.e., corruption in the utility sector might be reflected in the measure of corruption), it does not appear to have a significant impact on the main results.

For the most part, the coefficients on the additional variables are statistically insignificant and they have little impact on the main results (see Table 4 and Table 5). The coefficients on margin, the *de novo* dummy, and the number of cellular companies remain significant at a five percent level or lower, while the coefficients on the dummy indicating privatization of the fixed line telecommunications operator and the index of overdue payments remain significant at a 10 percent level. The coefficient on the number of fixed lines remains negative in all regressions but becomes statistically insignificant at conventional levels in one of the thirteen additional regressions.

Although the small sample of countries and the measure of bribes to a single sector (i.e., utilities) mean that this sample is not necessarily well suited to looking at the impact of macroeconomic or political factors on overall corruption, the two statistically significant results are of interest. First, in contrast to the results in Lederman *et al.* (2001), we do not find any evidence that corruption is lower in countries with parliamentary systems. Second, it appears that corruption is generally lower in countries that have privatized more (i.e., with higher scores on the EBRD's index of privatization). Although this might seem inconsistent with previous results that suggest that privatized enterprises pay similar levels of bribes to state-owned enterprises (i.e., the coefficient on the dummy variables indicating privatized enterprises was statistically insignificant once the measure of profitability is included in the analysis – see Table 3), this is not necessarily the case. Although privatization might not affect the bribes paid by the privatized enterprise itself, if privatization increases competition for all enterprises in the economy (i.e., including enterprises that remain state-owned), it might be correlated with lower levels of bribes for all enterprises facing this increased competition. That is, by increasing competition and decreasing rents for all enterprises throughout the economy, privatization might

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[37] Some variables suggested in the literature are omitted from the sensitivity analysis because there is insufficient variation (e.g., none of the countries in the sample were former British colonies), while others are omitted because there is insufficient data available for the countries in the sample (e.g., measures of ethno-linguistic

lower bribes for both privatized and state-owned enterprises. This interpretation is consistent with results from previous studies (see, e.g., Ades and Di Tella, 2000) and the results in this paper that suggest that openness to imports, which might also increase competition, is correlated with lower levels of corruption.

IV. CONCLUSION

Rather than discussing the political, macroeconomic and cultural factors that affect the overall level of corruption (see, e.g., Ades and Di Tella, 1999; Treisman, 2000; Lederman *et al.*, 2001), this paper primarily focuses on how characteristics of firms paying and receiving bribes affect the equilibrium level of bribes in the utility sector. Our conceptual framework suggests that characteristics of bribe takers (i.e., the rents available for extraction in the utility sector, the extent of competition in the sector and the penalty functions faced by utility employees) and bribe payers (i.e., the firm's willingness to pay bribes, the leverage that bribe takers have over the bribe payers, and the length of the payers relationship with the takers) should both be important. Further, the multiple-equlibria nature of corruption means that bribe payments in the utility sector should be higher in countries where the overall level of corruption is higher.

The empirical evidence from a survey of around 2000 enterprises in 21 countries in Eastern Europe and Central Asia is remarkably consistent with the conceptual framework. We find strong evidence that bribes paid to utilities are lower in countries with greater capacity and competition in the utility sector and where the utility has been privatized. On the side of bribe payers, enterprises that are more profitable, enterprises that have greater overdue payments to utilities and *de novo* private firms appear to pay higher bribes. Macroeconomic and political factors that contribute to higher corruption at the national level also appear to increase bribes in the utility sector.

The results from this study suggest that countries can reduce corruption in the utility sector through utility privatization and increased competition in the utility sector. In addition to reducing corruption by easing capacity constraints, privatization might improve internal incentives to reduce corruption while competition might reduces the utilities' ability to demand

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fractionalization).

bribes from enterprises using their services. Steps to reduce corruption in the utility sector might also have beneficial side effects on the overall level of corruption, due to the multiple equilibria nature of corruption.

It is less clear how to interpret the finding that more profitable firms pay higher bribes. If the "speed money" theory is correct (i.e., bribes are acting as price mechanism), then a modest level of corruption might actually improve efficiency (over no corruption) so long as capacity constraints remain in the utility sector. This is because under this hypothesis bribes ensure that utility connections are allocated to the enterprises that value them most highly, resulting in an efficient allocation of resources. However, if the "endogenous harassment" theory is correct, rent seeking and stealing mutes the firms' incentives to take costly actions to improve efficiency and increases incentives to hide profits. Consequently, corruption will have an adverse impact on efficiency. While our data do not allow us to distinguish between these two scenarios, future empirical work to do so is clearly desirable.

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TABLE 1: SUMMARY STATISTICS AND SOURCES FOR MACROECONOMIC AND POLITICAL VARIABLES.

Variable	*Description*	*Source*	*Mean*	*Std. Dev.*
Number of Cellular Companies	Number	Authors' Calculations (see text).	2.815	1.543
Electricity Distribution Privatized	Dummy	Bacon (1999)	0.424	0.494
Country has Parliamentary System	Dummy	Beck *et al.* (2001)	0.246	0.431
Years of Democracy	Years that country has scored six or higher on legislative and executive index of electoral competitiveness (IEC) since start of transition. See below.	Beck *et al.* (2001)	3.779	2.751
Democracy Index	Index (0-7). Avg. score on legislative and executive index of electoral competitiveness (IEC). High numbers mean greater level of democracy	Beck *et al.* (2001)	6.760	0.539
EBRD Index for large-scale privatization	Index (1-4) -- Higher scores mean greater extent of privatization	EBRD (1999)	3.041	0.676
Political Rights	Index (1-7) -- Higher scores mean greater democracy	Freedom House (2000)	3.184	1.804
Decentralization	Local and State Spending as share of total government spending	International Monetary Fund (2001)	0.326	0.115
Regulation Index	Index (1-5). Higher scores mean regulation is more restrictive	Heritage Foundation (1997)	3.379	0.780
Corporate Tax Index	Index (1-5). Higher scores mean corporate tax rates are higher	Heritage Foundation (1997)	3.079	0.651
Corruption (Overall)	Index (1-6). International Country Risk Guide Index of Corruption. Higher scores mean less corruption.	PRS Group (1999)	3.200	1.097
Number of Fixed Lines	Per 100 inhabitants	International Telecommunications Union (2000)	20.987	9.930
Fuel, Mineral and Metal Exports	As % of GDP	World Bank (2001)	24.075	22.494
Population	Natural Log	World Bank (2001)	16.414	1.384
Inflation	Average between 1996 and 1999	World Bank (2001)	36.939	67.545
Openness	Imports as percent of GDP	World Bank (2001)	46.675	17.913
Government Expenditures	As % of GDP	World Bank (2001)	16.900	5.115
GDP Growth.	Average between 1996 and 1999	World Bank (2001)	1.978	4.244
Per Capita GDP	000s of US $	World Bank (2001)	5.906	3.175
Fixed Line Telecommunications Operator Privatized	Dummy	World Bank Telecommunications Department	0.502	0.500
Country is Landlocked	Dummy	World Bank Global Development Network Growth Database	0.388	0.487

Note: Data is for 1998, except where noted and for data from Beck *et al* (2001) and Heritage Foundation (1997), which are from 1997 since data for 1998 were not available.

Table 2: Means, Variances and Descriptions of Enterprise Level Variables.

Variable	*Description*	*Mean*	*Std. Dev.*
Extent of Overdue Payments to Workers	Index (1-4). Higher values mean less overdue payments.	3.429	0.941
Extent of Overdue Payments to Utilities	Index (1-4). Higher values mean less overdue payments.	3.429	0.928
Extent of Overdue Payments to Suppliers	Index (1-4). Higher values mean less overdue payments.	3.132	1.056
Margin	Unit Sales Price less Operating Costs (as percent of operating costs)	16.508	15.643
Ownership (omitted Category is state-owned)			
Largest Shareholder – Other Private – Privatized	Dummy. Other Private implies that it is not owned by foreign enterprises or individuals or by insiders	0.183	0.387
Largest Shareholder – Insiders	Dummy. Insiders are workers and managers	0.153	0.360
Largest Shareholder – Foreign	Dummy.	0.034	0.182
Largest Shareholder – Other Private – De Novo	Dummy. Other Private implies that it is not owned by foreign enterprises or individuals or by insiders	0.488	0.500
Size (omitted category is over 500 employees)			
Fewer than 9 employees	Dummy	0.265	0.441
Between 10 and 49 employees	Dummy	0.200	0.400
Between 50 and 99 employees	Dummy	0.160	0.367
Between 100 and 199 employees	Dummy	0.137	0.344
Between 200 and 499 employees	Dummy	0.154	0.361
Ownership (omitted category is 'other services')			
Sector -- Transportation	Dummy	0.061	0.240
Sector - Wholesale and Retail Trade	Dummy	0.269	0.443
Sector -- Manufacturing	Dummy	0.297	0.457
Sector -- Mining and Construction	Dummy	0.099	0.298
Sector -- Farming, fishing, forestry	Dummy	0.135	0.342
Region			
Region -- South East Europe	Dummy	0.164	0.371
Region -- Commonwealth of Independent States	Dummy	0.535	0.499
Region -- Central Europe and the Baltic States	Dummy	0.301	0.459

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Table 3: Impact of enterprise and country characteristics on bribes to utilities.

Estimation Method	**Interval Regression**			
Dependent Variable	**Percent of Revenues Paid to Utilities in Bribers**			
	Base		**Margin Omitted**	**Oil Exporting Dummy**
Number of Observations	1822	1822	2327	2200
Sector Dummies	Yes	Yes	Yes	Yes
Size of Enterprise Dummies	Yes	Yes	Yes	Yes
Utility Privatization				
Fixed Line Telecom Operator Privatized	-0.6610***	-0.6698***	-0.5741***	-0.7136***
(Dummy)	(-4.00)	(-4.07)	(-3.81)	(-4.87)
Electricity Distribution Privatized	-0.2947		-0.5609***	-0.1222
(Dummy)	(-1.49)		(-3.15)	(-0.93)
Capacity and Competition				
Fixed Lines	-0.0424***	-0.0364***	-0.0531***	-0.0348***
(Per 1000 people)	(-3.60)	(-3.30)	(-4.85)	(-3.20)
Cellular Companies	-0.2182***	-0.2278***	-0.1769***	-0.0970**
(Number)	(-3.16)	(-3.32)	(-2.76)	(-2.09)
Enterprise Profitability				
Margin	0.0127***	0.0126***		0.0113***
(Unit Sales Price less Operating Costs as % of operating costs)	(3.73)	(3.70)		(3.81)
Enterprise Ownership				
Largest Shareholder – Other Private – *De Novo*	0.6768***	0.6529***	0.7915***	0.4942**
(Dummy)	(2.92)	(2.84)	(3.72)	(2.59)
Largest Shareholder – Other Private – Privatized	0.3139	0.2882	0.4236**	0.2573
(Dummy)	(1.38)	(1.28)	(2.03)	(1.35)
Largest Shareholder – Foreign	0.2370	0.2519	0.3818	0.0131
(Dummy)	(0.62)	(0.66)	(1.11)	(0.04)
Largest Shareholder – Insiders (Managers or Employees)	0.3444	0.3249	0.3632	0.1312
(Dummy)	(1.42)	(1.35)	(1.61)	(0.66)
Overdue Payments to Utilities and Others				
Overdue Payments to Utilities	-0.1491*	-0.1641**	-0.1345*	-0.1317*
(Index – higher values mean less overdue payments)	(-1.87)	(-2.08)	(-1.85)	(-1.96)
Overdue Payments to Workers	0.1092	0.1214	0.0535	0.1237*
(Index – higher values mean less overdue payments)	(1.32)	(1.48)	(0.71)	(1.81)
Overdue Payments to Suppliers	-0.0556	-0.0614	-0.0526	-0.0492
(Index – higher values mean less overdue payments)	(-0.83)	(-0.92)	(-0.85)	(-0.85)
Country Controls				
Per Capita GDP in 1998	0.0067	-0.0086	0.0366	-0.0330
(000s of US dollars)	(0.18)	(-0.24)	(1.06)	(-0.89)
Political Rights	-0.2873***	-0.2767***	-0.2307***	-0.2010***
(Index – Higher values mean greater democracy)	(-4.25)	(-4.14)	(-3.84)	(-3.44)
GDP growth	-0.0584***	-0.0599***	-0.0690***	-0.0615***
(Average between 1996 and 1998)	(-3.47)	(-3.58)	(-4.49)	(-4.00)
Openness	-0.0157**	-0.0106**	-0.0185***	-0.0099**
(Imports as share of GDP)	(-2.58)	(-2.14)	(-3.23)	(-2.27)
Fuel, Mineral and Metal Exports	0.0186***	0.0181***	0.0138***	
(As share of total exports)	(3.81)	(3.72)	(3.11)	
Oil Exporter				0.5848***
(Dummy)				(2.76)
Log-Likelihood	-1736.8	-1737.9	-2084.2	-2261.6

Data Source: The World Business Environment Survey (WBES) ©2000 The World Bank Group.
T-statistics are in parentheses. * Significant at 10% level. ** Significant at 5% level. *** Significant at 10 percent level.
[a] Regressions include 6 dummies for enterprise size based upon employment. The categories are: enterprises with fewer than 10 (full-time) employees; between 10 and 49 employees; between 50 and 99 employees; between 100 and 199 employees; between 200 and 499 employees and over 500 employees. [b] Regressions include seven dummies based upon sector of operations. The categories are: manufacturing; agriculture; other industry; retail and wholesale trade; transportation; other services; and other.

Table 4: Coefficients on Main Variables when additional independent variables are included in regression (see Table 3, Column 2 for base regression)..

	DEPENDENT VARIABLE IS PERCENT OF REVENUES PAID TO UTILITIES IN BRIBES						
Additional Independent Variable	**None**	**Region Dummies[a]**	**Regulation Index**	**Corporate Tax Rate Index**	**Democracy Index**	**Years Since Democracy**	**Parliamentary Dummy**
Number of Observations	1822	1822	1636	1636	1822	1822	1822
Coefficient on Additional Independent Variable	—	—	*-0.0063*	*0.0302*	*0.1610*	*0.0061*	*0.5008***
	—	—	*(-0.05)*	*(0.28)*	*(0.94)*	*(0.16)*	*(2.07)*
Coefficients on other variables of Interest							
Fixed Line Telecom Operator Privatized	-0.6698***	-0.5192***	-0.6262***	-0.6233***	-0.6217***	-0.6605***	-0.5834***
(Dummy)	(-4.07)	(-2.72)	(-3.57)	(-3.56)	(-3.62)	(-3.78)	(-3.49)
Fixed Lines	-0.0364***	-0.0488***	-0.0426***	-0.0426***	-0.0374***	-0.0366***	-0.0148
(Per 1000 people)	(-3.30)	(-3.95)	(-3.33)	(-3.76)	(-3.38)	(-3.30)	(-0.98)
Cellular Companies	-0.2278***	-0.1922**	-0.1886**	-0.1907**	-0.2657***	-0.2272***	-0.1746**
(Number)	(-3.32)	(-2.58)	(-2.19)	(-2.21)	(-3.33)	(-3.30)	(-2.39)
Margin	0.0126***	0.0125***	0.0113***	0.0113***	0.0125***	0.0126***	0.0128***
(Sales Price less Operating Costs as % of operating costs)	(3.70)	(3.68)	(3.17)	(3.18)	(3.66)	(3.70)	(3.75)
Largest Shareholder – Other Private -- De Novo	0.6529***	0.6739***	0.5405**	0.5428**	0.6480***	0.6524***	0.6644***
(Dummy)	(2.84)	(2.91)	(2.21)	(2.23)	(2.81)	(2.83)	(2.88)
Overdue Payments to Utilities	-0.1641**	-0.1420*	-0.1696**	-0.1696**	-0.1555*	-0.1639**	-0.1565**
(Index – higher values mean less overdue payments)	(-2.08)	(-1.78)	(-2.03)	(-2.03)	(-1.96)	(-2.08)	(-1.98)

Data Source: The World Business Environment Survey (WBES) ©2000 The World Bank Group.
T-statistics are in parentheses. * Significant at 10% level. ** Significant at 5% level. *** Significant at 10 percent level.
Note: Regressions include all variables included in Column 2 of Table 3 including sector and size dummies. [a] Regional dummies are dummies for Central Europe, Southeastern Europe and the Commonwealth of Independent States.

Table 5: Coefficients on Main Variables when additional independent variables are included in regression (see Table 3, Column 2 for base regression).

	DEPENDENT VARIABLE IS BRIBES PAID TO UTILITIES AS PERCENT OF REVENUES						
Additional Independent Variable	**Privatization Index**	**Landlocked Dummy**	**Population (natural Log)**	**Average Inflation**	**Government Expenditures**	**Decentralization**	**Overall Corruption**
Number of Observations	1822	1822	1822	1822	1822	1655	1737
Coefficient on Additional Independent Variable	***-0.4436******	***-0.2051***	***0.0694***	***-0.0014***	***-0.0037***	***0.4047***	***-0.0556***
	(-3.29)	***(-0.98)***	***(0.58)***	***(-1.25)***	***(-0.18)***	***(0.37)***	***(-0.66)***
Coefficients on other variables of Interest							
Fixed Line Telecom Operator Privatized	-0.4418**	-0.5977***	-0.6948***	-0.7413***	-0.6794***	-0.4498*	-0.6799***
(Dummy)	(-2.47)	(-3.34)	(-4.06)	(-4.24)	(-3.92)	(-1.71)	(-4.16)
Fixed Lines	-0.0312***	-0.0389***	-0.0358***	-0.0244*	-0.0361***	-0.0301**	-0.0427***
(Per 1000 people)	(-2.78)	(-3.43)	(-3.23)	(-1.69)	(-3.23)	(-2.02)	(-3.81)
Cellular Companies	-0.1617**	-0.2546***	-0.2744***	-0.2712***	-0.2192***	-0.2006**	-0.1533**
(Number)	(-2.27)	(-3.44)	(-2.59)	(-3.50)	(-2.61)	(-2.39)	(-1.98)
Margin	0.0127***	0.0125***	0.0126***	0.0123***	0.0126***	0.0129***	0.0119***
(Sales Price less Operating Costs as % of operating costs)	(3.73)	(3.68)	(3.70)	(3.61)	(3.71)	(3.45)	(3.47)
Largest Shareholder – Other Private -- De Novo	0.6495***	0.6465***	0.6538***	0.6546***	0.6520***	0.8611***	0.6103***
(Dummy)	(2.81)	(2.81)	(2.84)	(2.85)	(2.83)	(3.17)	(2.63)
Overdue Payments to Utilities	-0.1594**	-0.1601**	-0.1666**	-0.1652**	-0.1642**	-0.1669*	-0.1747**
(Index – higher values mean less overdue payments)	(-2.02)	(-2.03)	(-2.11)	(-2.10)	(-2.09)	(-1.91)	(-2.17)

Data Source: The World Business Environment Survey (WBES) ©2000 The World Bank Group.
T-statistics are in parentheses. * Significant at 10% level. ** Significant at 5% level. *** Significant at 10 percent level.
Note: Regressions include all variables included in Column 2 of Table 3 including sector and size dummies.

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